



MODIS C6 Geolocation Status Update

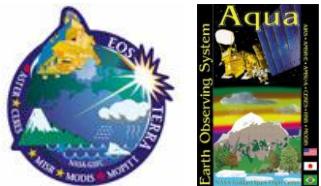
MODIS Science Team Meeting
Calibration Breakout Session

April 15, 2013 → May 1, 2014

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MODIS Geolocation Team

NASA GSFC Code 619





Geolocation C5/C6 results

Terra

- Excellent results – Root Mean Square Error (RMSE) in nadir equivalent units is better than accuracy goal (50 m)
- Large errors occur ~1.5 hr after maneuvers (about 12 per year)
 - accuracy in following orbit suspect

Results up to Sept 29, 2013

Along-track RMSE (m)

Along-scan RMSE (m)

Years of Data

Ground Control Point Match-ups/day

Days missing (no residuals)

Aqua

- Good results – RMSE is better than goal (50 m) in track direction but slightly over goal in scan direction (but much better than specification – 150 m)
- Definitive ephemeris is used for best results – causes up to 24 hr processing delay

Terra		Aqua	
C5	C6	C5	C6
43	43	47	46
44	44	53	53
		13.5	11.2
262	212	226	183
124	50	97	10

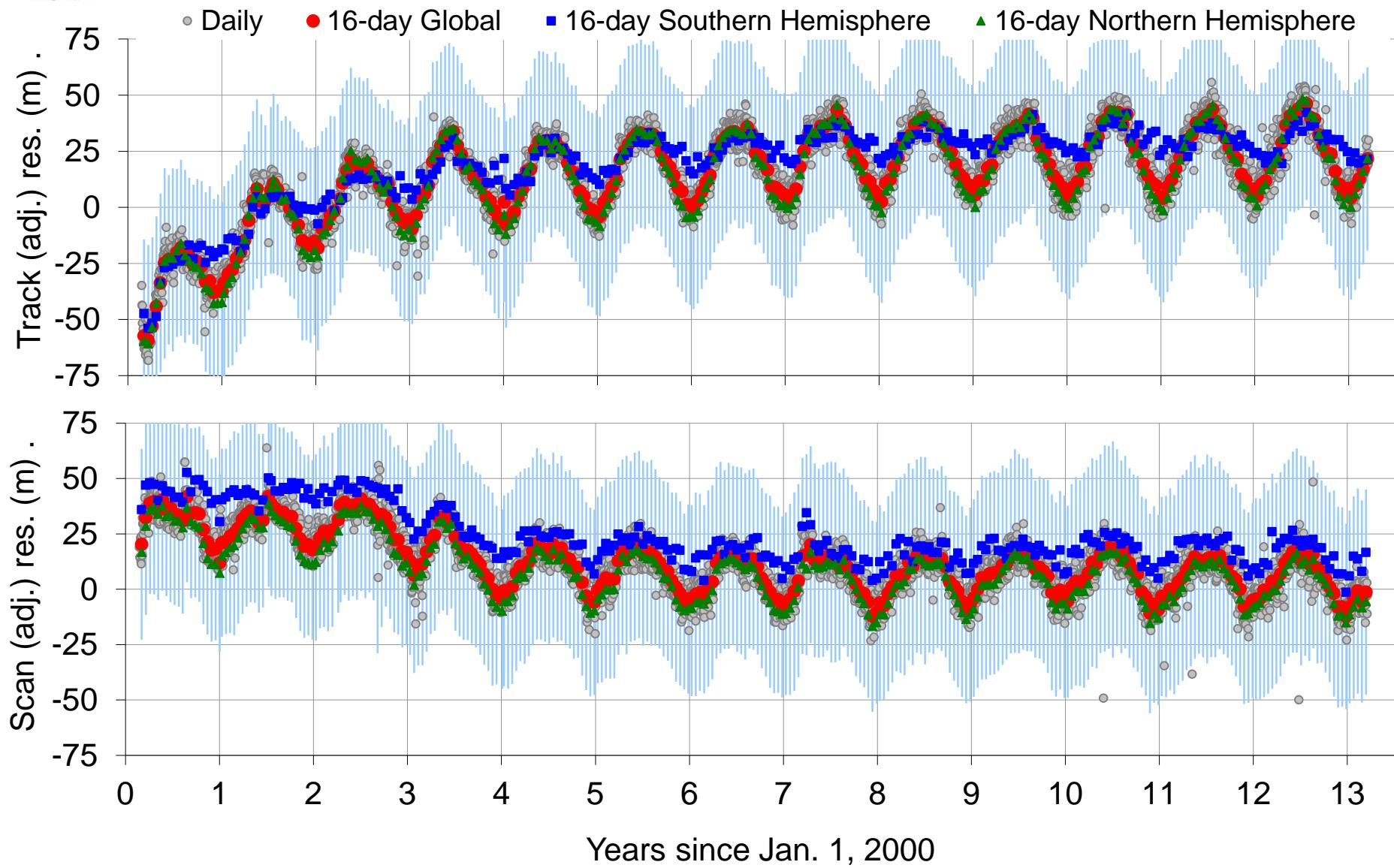
Note: These results are for MODIS Band 1, which is used in the control point matchup. Other bands must be offset by the band-offsets published by the MODIS calibration team.



Terra trend and update details



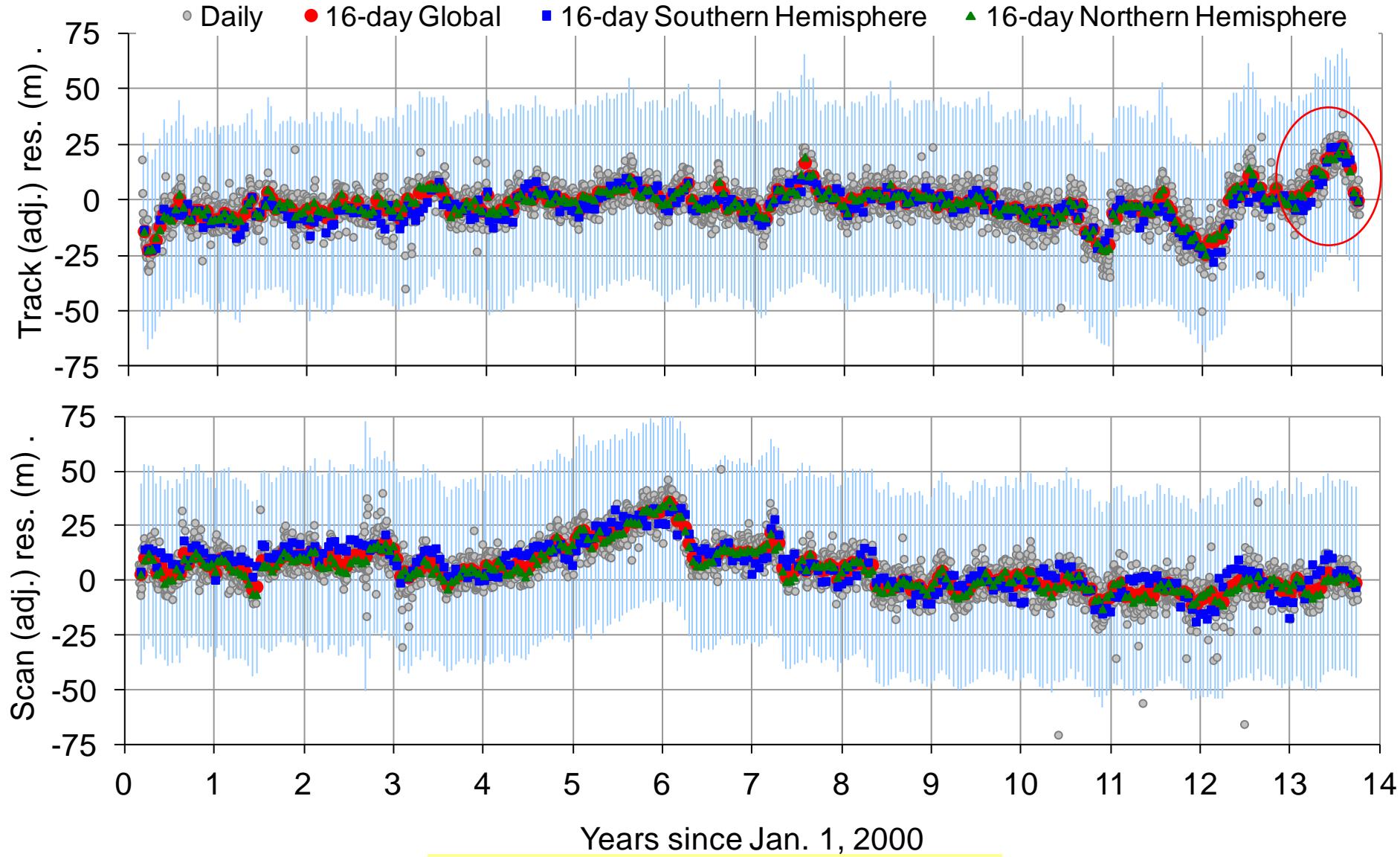
Terra long-term trend (w/o correction)



RMSE with no correction: Track: 49 m (+6 m vs C6) Scan: 47 m (+3 m vs C6)

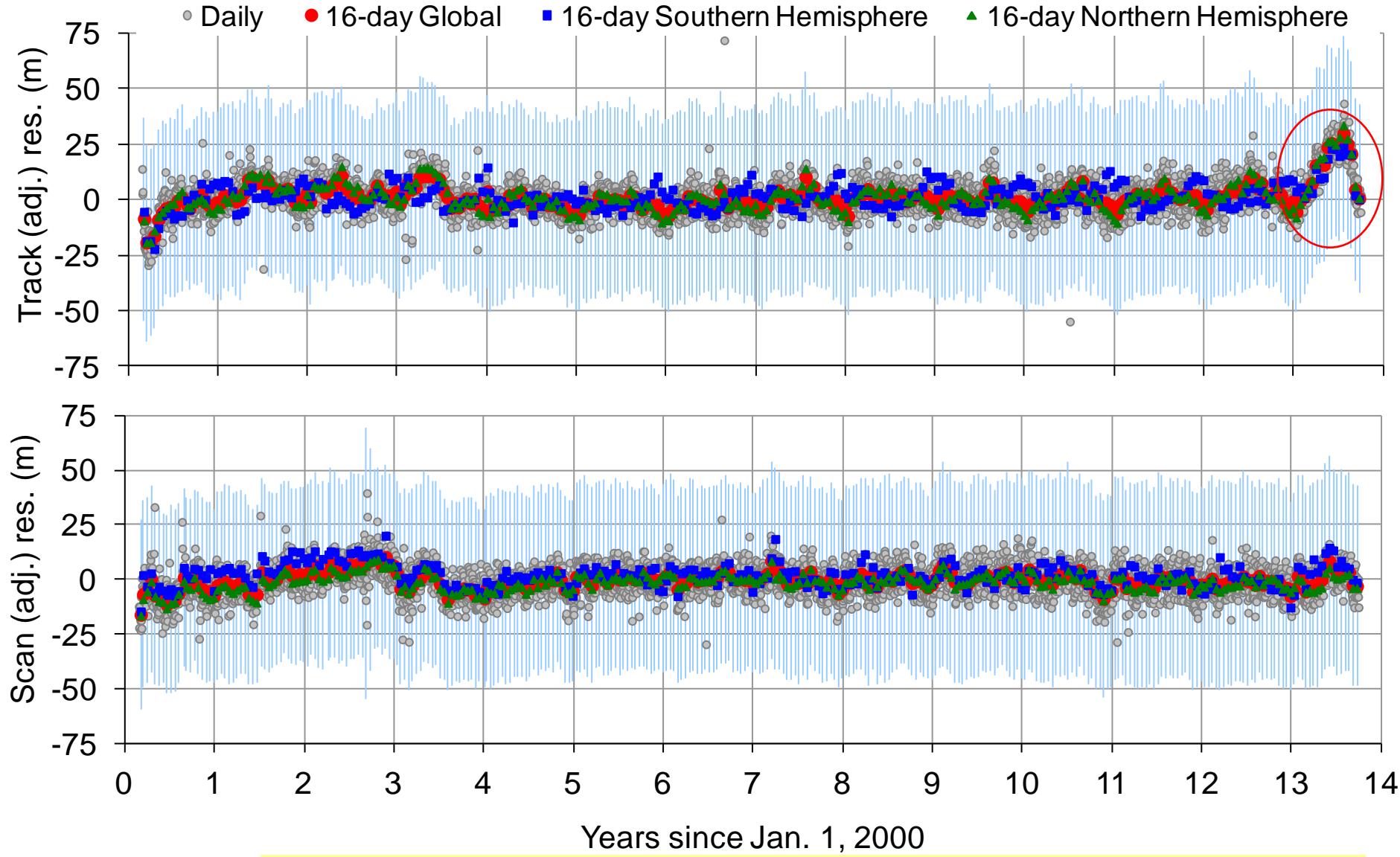


Actual Terra C5 residuals





Actual Terra C6 residuals

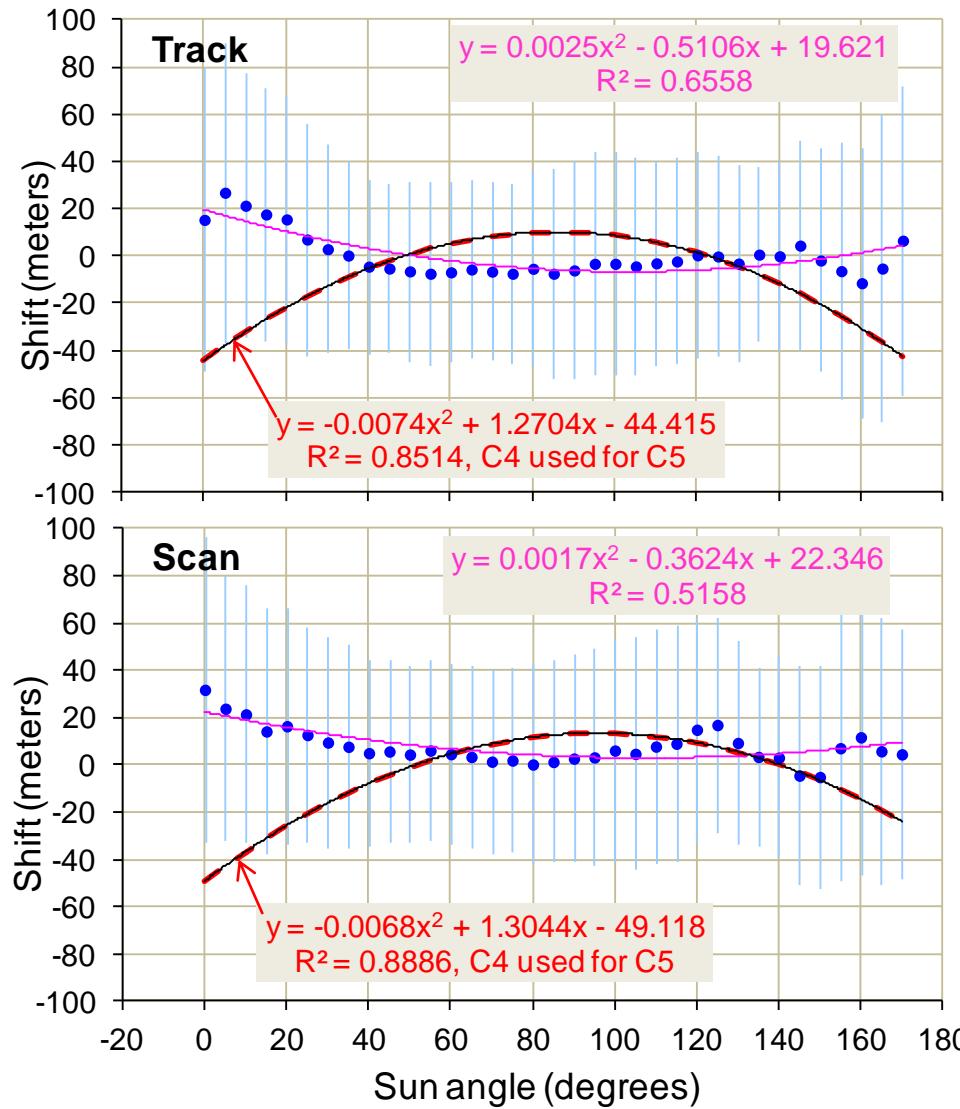


C6 RMSE Track: 43 m (= C5) Scan: 44 m (= C5), 74 more datadays

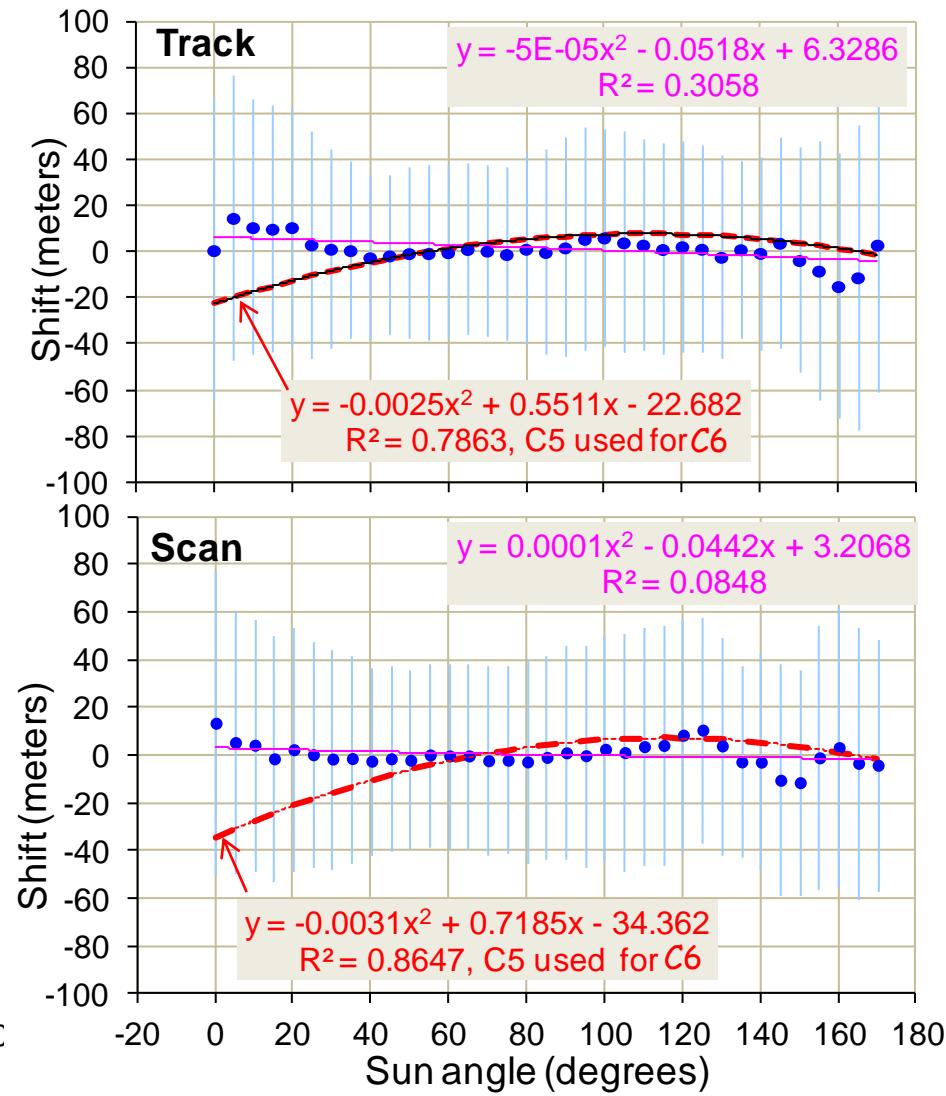


Terra Sun angle Correction

C5 results



C6 results



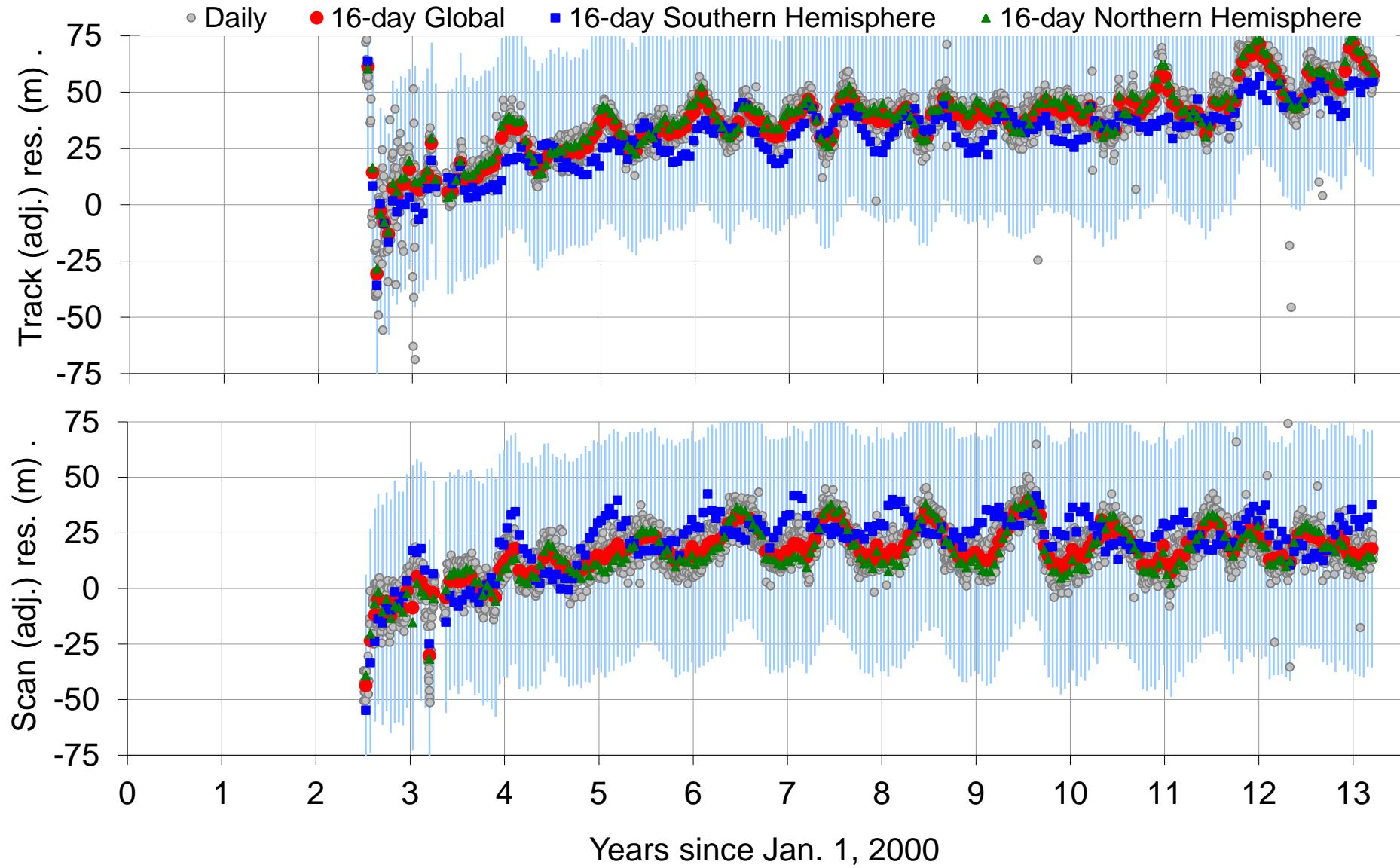
Small overcorrection in C5 – was corrected in C6



Aqua trend and update details



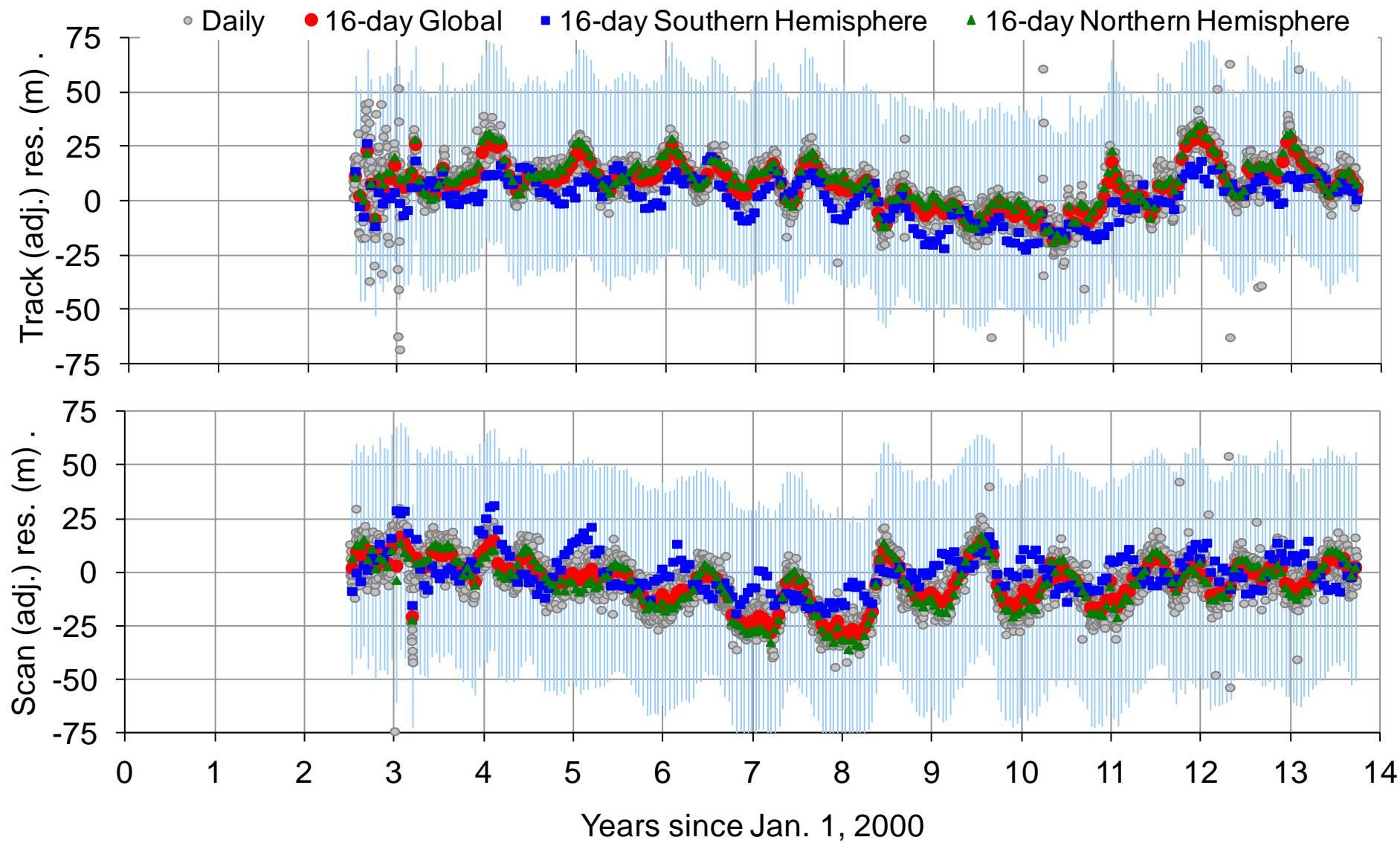
Aqua Long-term Trend (w/o Correction)



RMSE with no correction: Track: 60 m (+15 m vs C6) Scan: 56 m (+5 m vs C6)



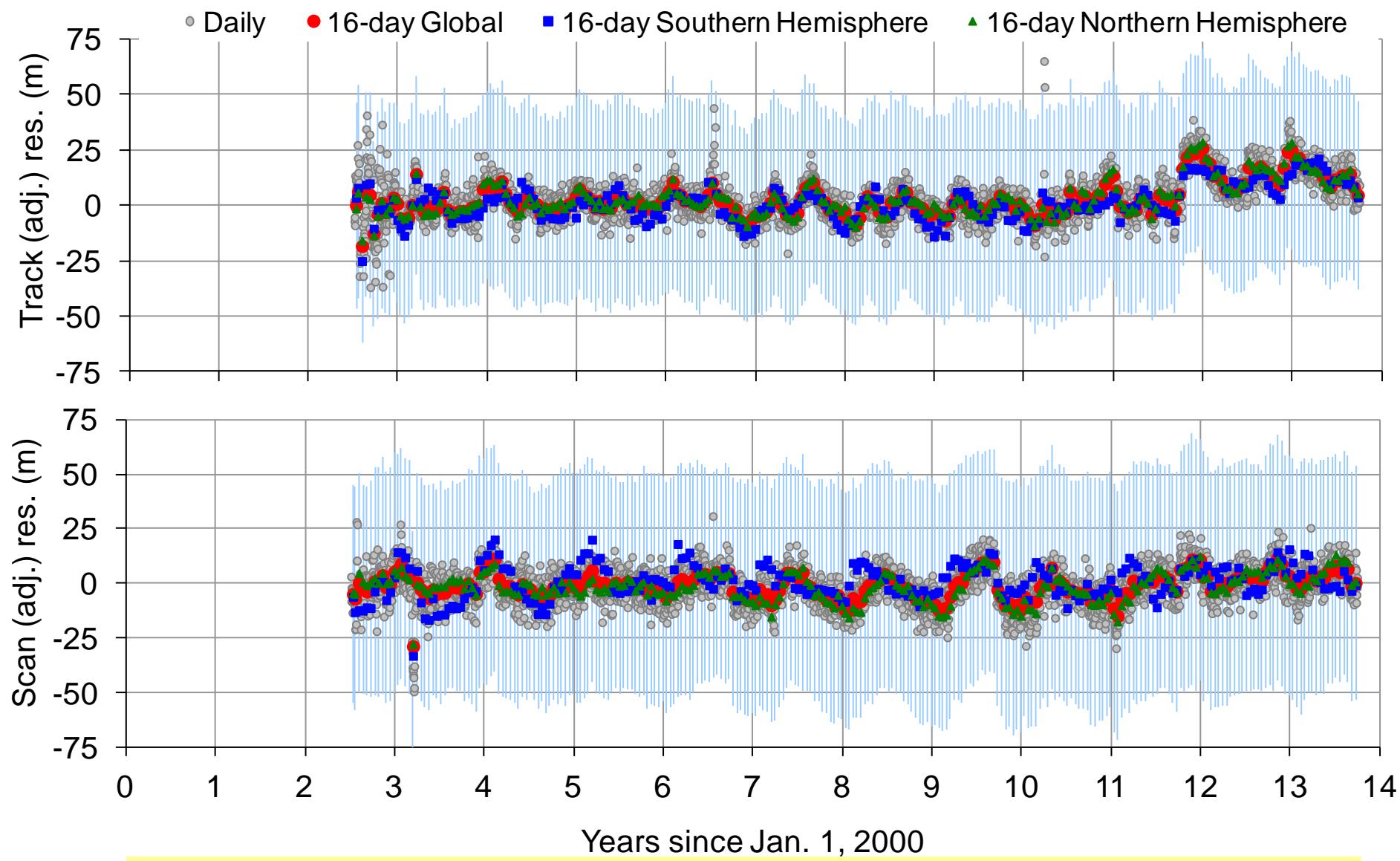
Actual Aqua C5 residuals



C5 RMSE Track: 47 m Scan: 53 m



Actual Aqua C6 residuals

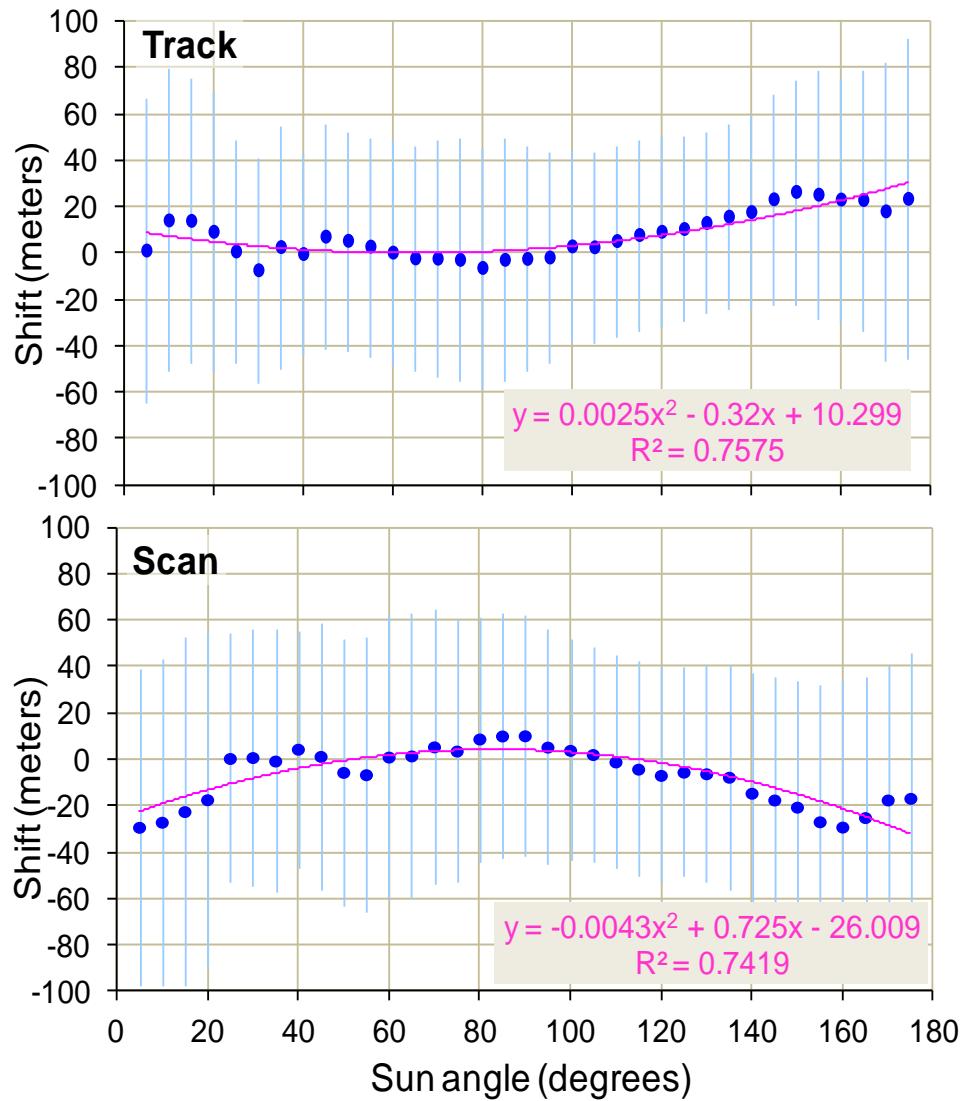


C6 RMSE Track: 46 m (-1 m vs C5) Scan: 53 m (= C5), 87 more datadays

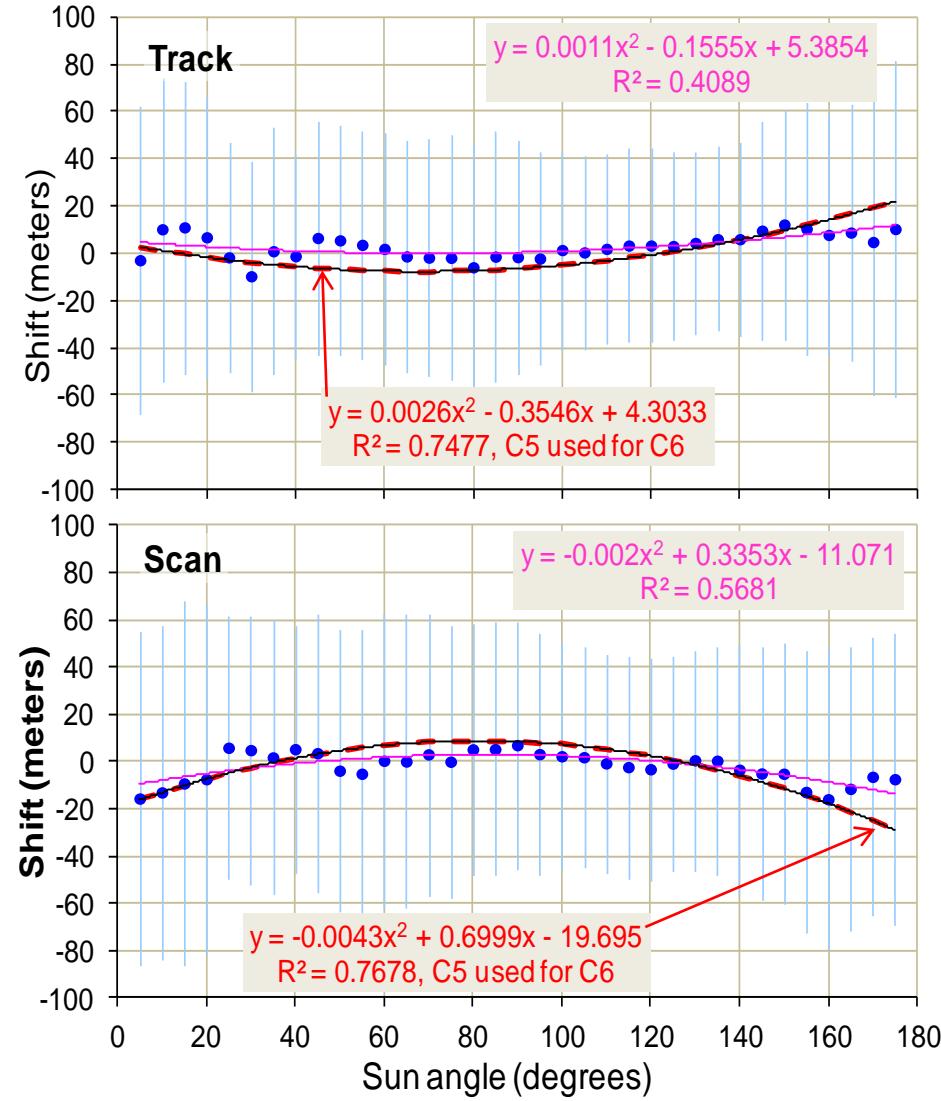


Aqua Sun angle Correction

C5 results



C6 results



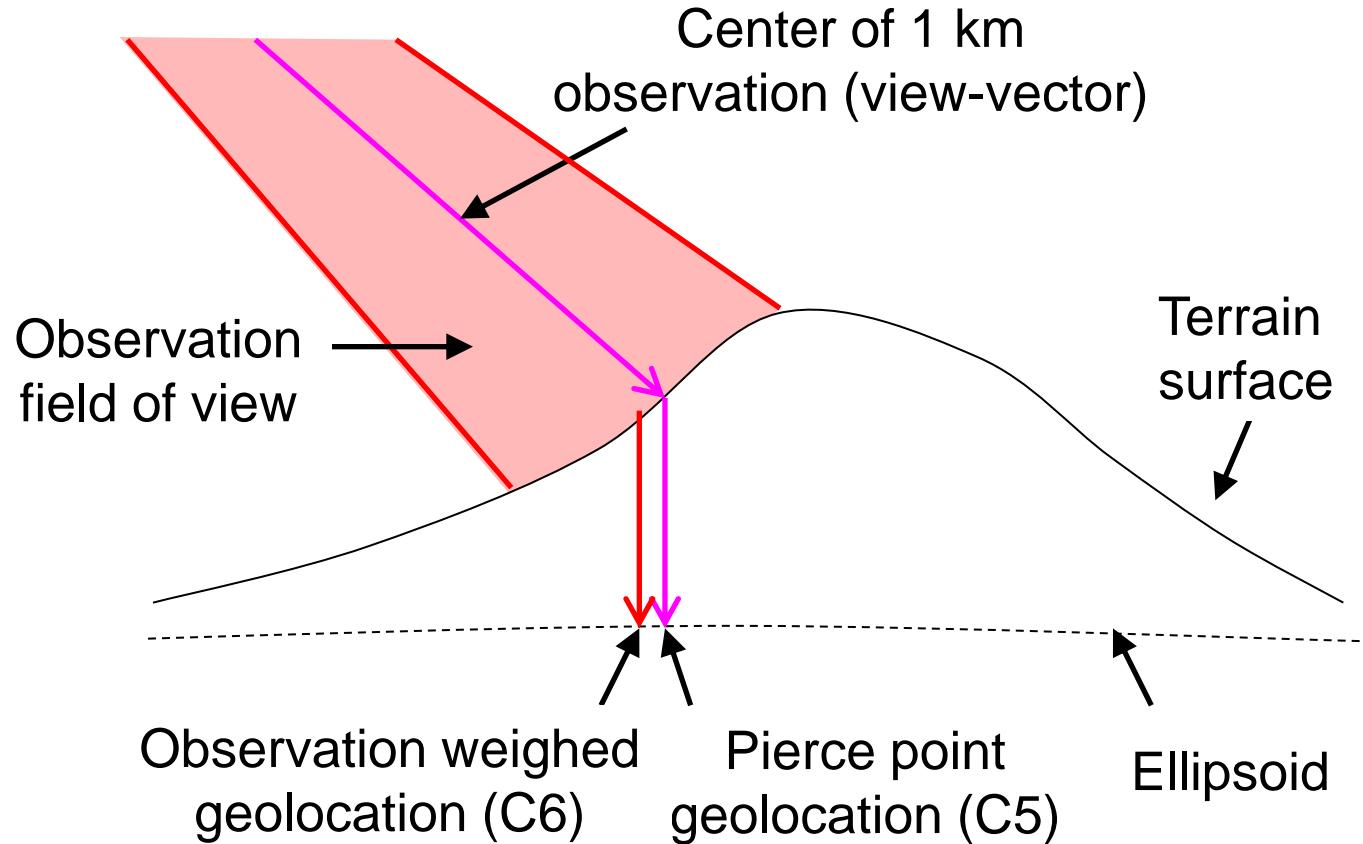


C6 Changes - Algorithm (Science)

1. Update error analysis: use C5 residuals to update long-term trend, sun-angle corrections and geometric parameter biases
2. Incorporate new ancillary data
 - a. Improved 500m Shuttle Radar Terrain Mission (SRTM) Digital Elevation Model data
 - b. Improved Land/water mask (500m) developed by UMD
3. Compute 500m geolocation and provide in the form of 8-bit offsets from a bilinear-interpolation of the 1 km data
4. Enhanced 1 km terrain correction (area based)
 - synergistic with 500m geolocation, since weighted average of 500m pixel centers is used to approximate 1km time-integrated weighting function



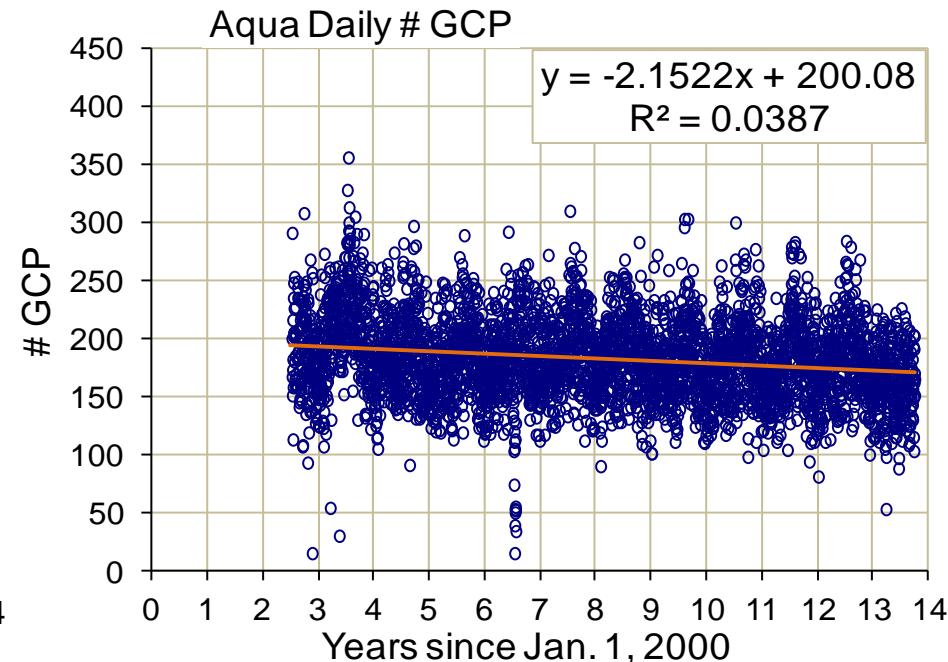
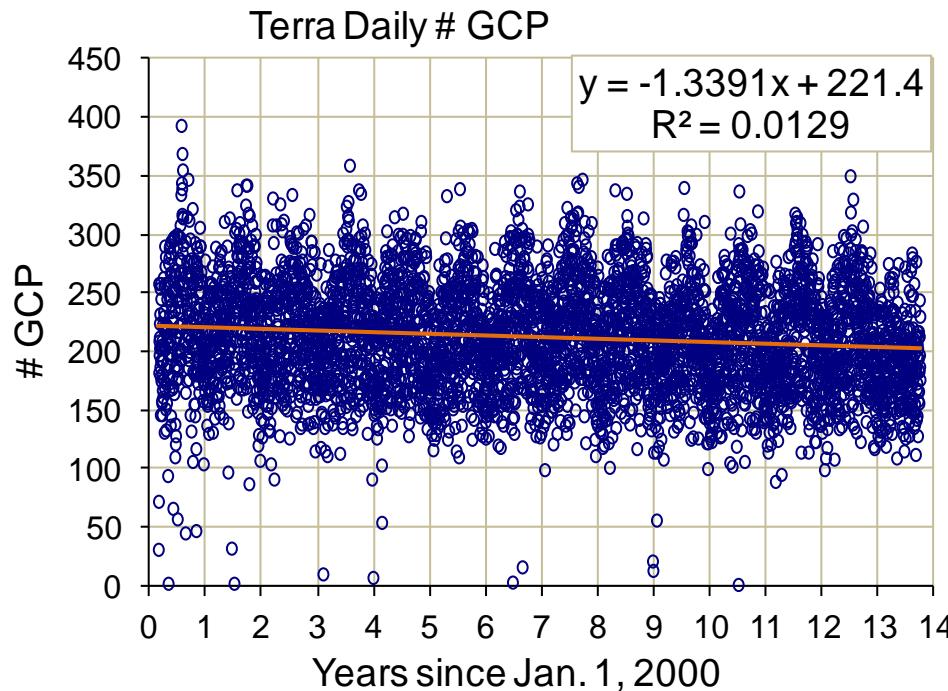
C6 observation weighted terrain correction





C7 update? Potential improvements

1. Correct upward “bump” to Terra geolocation errors in the track direction in mid-2013 – correct an issue in the LUTs updating process
2. Refresh aging ground control point (GCP) chip library (some chips are from Landsat scenes as old as 1986) with Landsat 8 scenes and new 500m DEM (existing chips were generated with old 1 km DEM data, **main difference in mountainous and remote areas**)
3. Others?





Questions?